TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Trifolium No. 2	The banks of this drain have been denuded of most vegetation in lower reaches near the river. There is bank slumping and disturbance along the channel, and considerable rubble and debris on both bank slopes. Near the river is a thin stand of salt cedar and mostly barren riparian zone.
Trifolium No. 3	Near the New River, the banks of the drain are generally covered by stands of common reed and saltgrass. The drain cuts deeply to the river, with the upper slopes largely barren and the lower half of the slope covered by salt and bermuda grasses. There are scattered stands of salt bush and common reed along the banks.
Trifolium No. 4	There are lines with stands of common reed and saltgrass along most of channel. It is fairly open as there is a wide bench between the channel and the slope. The bench and slopes are mostly covered by saltgrass or bermuda grass and few stands of common reed. Near the end of the drain at the New River, the drain is deeper with an arrow 2- to 4-foot-wide channel at the bottom. The vegetation in the lower reach appears to have been sprayed with a herbicide.
Trifolium No. 5	This broad drainage channel has salt cedar and common reed along the banks. Near the New River, the drain passes through salt cedar thickets.
Trifolium No. 6	This deep drain channel is covered by common reed from the point downstream from the lateral spill to the confluence with the New River. Upstream from the lateral spill, additional stands of common reed occur.
Trifolium No. 7	Vegetation along Trifolium No. 7 is mostly saltgrass and stands of common reed; some vegetation appears to be dead from herbicide spray. The extent of the saltgrass cover on the bank slopes may also be limited by herbicide application.
Trifolium No. 8	The drainage channel is lined with salt cedar or is barren as a result of herbicide use. Near the channel alignment bend at the junction of Foulds Road and Lack Road, common reed and saltgrass line the banks of the 4- to 6-foot-wide ditch. Flow in the lower reach of the drain is augmented by spillage from the lateral at Gate 180E.
Trifolium No. 9	The upper reach is the broad channel about 6- to 8-feet-wide lined with saltgrass or common reed, although extensive portions appear to have been sprayed with herbicide. Spillage from the lateral mixes with the drain about 200 yards upstream of the New River. Portions of the lower channel are barren.
Trifolium No. 10	The channel width of Trifolium No. 10 is about 2 to 3 feet near Foulds Road and is lined with saltgrass, bermuda grass, and scattered stands of common reed. Near the end of the drain are trunks of dead salt cedar and stands of common reed that appear to have been killed by herbicides.
Trifolium No. 11	The drainage channel is about 7-feet wide near the confluence with the New River. The banks along the drain are lined with saltgrass and stands of common reed.
Trifolium No. 12	Along the lower reach of Trifolium No. 12, north of Foulds Road, the drain is lined with thick stands of common reed and salt cedar. To the west are thick stands of salt cedar bordering ponds of the NWR and private duck clubs. Before reaching the New River, the drain bends toward the Salton Sea and flows parallel to the New River and passes through cattail stands.
Barbara Worth	Predominantly barren channel with small patches of salt cedar and salt bush. A dense thicket of salt bush and salt cedar borders the top of the drain.
Ash Lat. 18	Typical vegetation found in this drain consists of saltgrass, bermuda grass, salt bush, and salt cedar.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Ash No. 34	Saltgrass and bermuda grass are the dominant vegetative features of this drain, carpeting the lower edges of the banks.
Ash No. 30	The banks of the drain are barren except for the lower edges, where a band of saltgrass and bermuda grass lines the channel to the water line.
Ash Lat. 37	Saltgrass and bermuda grass are the dominant vegetation features of this drain, covering the lower edges of the channel banks.
Schenk No. 6	Typical vegetation found in this drain consists of saltgrass, bermuda grass, and salt bush.
Ash No. 25	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, salt bush, common reed, and mallow.
South Central No. 2-B	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, salt bush, common reed, and mallow.
EHL No. 1	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
EHL No. 6	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
EHL No. 7	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow
Bonds Corner	At the proposed interceptor location, common reed is the dominant vegetative type in this drain. Saltgrass is found at the lower edges of the banks along the water line.
Verde No. 1	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
Verde No. 2	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
Whitcomb No. 3	Typical vegetation found in this drain includes common reed, saltgrass, bassia, salt bush, and juncus. Common reed is found in thick stands at scattered locations along this drain.
Hemlock Lat. 4	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
Peach	Typical vegetation found in the drain includes saltgrass, salt bush, bermuda grass, and mallow.
Pampas	Salt cedar and common reed are found intermittently along the banks. Saltgrass and bermuda grass form a carpet along the lower edges.
Palmetto	Saltgrass and bermuda grass are the dominant plant species found in this drain. Salt cedar, salt bush, and common reed can be found interspersed along the banks.
Pear No. 2	The banks of this drain are predominantly bare, except for the lower edges, which are covered with a thick layer of saltgrass and bermuda grass. Salt bush is found occasionally along the top of the banks.
Warren	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 8	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
EHL No. 10	Saltgrass and bermuda grass form a dense cover along the bottom and lower edges of this drain, obscuring the water level. Mexican sprangletop and salt bush are found occasionally mixed within this stand.
EHL No. 11	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 12	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 13	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 14	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 15	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orita	Vegetation cover in this drain is predominantly saltgrass and bermuda grass.
Ohmar	The banks of this drain are mostly covered by saltgrass and bermuda grass, with patches of heliotrope, salt bush, and bassia growing along the upper reaches of the bank.
Orange	Dominant plant species along this drain are saltgrass and bermuda grass, forming a dense carpet along the lower edges. Small stands of salt bush and five-hook bassia are interspersed along the drain.
Oxalis	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Olive	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orchid	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Holtville	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Occident	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orient	This contains sparsely vegetated with salt cedar and salt bush. Past herbicide use is evident by the dead vegetation along the upper reaches of the bank.
Munyon	Dominant plant species along this drain are common reed, salt bush, and saltgrass. Saltgrass and bermuda grass form a dense carpet along the lower edges of the bank in spots. In the Alamo River floodplain, a section of this drain has extensive debris piles along the tops of its banks.
Myrtle	Typical vegetation found in this drain are salt cedar, salt bush, saltgrass, and bermuda grass. The saltgrass and bermuda grass inhabit the lower edges of the drain towards the water line, forming a thick layer.
Mullen	Saltgrass and bermuda grass cover the lower edges of this drain, with salt bush and curly dock interspersed among the sloping banks.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Maple	This is vegetated primarily with saltgrass and salt bush, with some juncus growing along the water's edge.
Mesquite	Common reed is the dominant cover type in this drain, forming dense stands in some areas. Salt cedar and saltgrass are also found interspersed among the common reed.
Magnolia	Dominant plant species along this drain are common reed and salt bushy. In some sections of the drain, common reed was growing so densely as to obscure the bottom.
Moss	A light covering of saltgrass covers the lower half of this drain along the steep banks. Common reed has also established itself along this drain, occasionally growing in thick patches.
Oak	At the proposed interceptor location, the banks of this drain are predominantly bare with scattered patches of saltgrass and bermuda grass.
Osage	This contains vegetation common to drain sand ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Lewis	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orita	Vegetation cover is predominantly saltgrass and bermuda grass.
North Central	The banks of this drain were typically vegetated only at the bottom with saltgrass and bermuda grass. Some sections of the drain contained a thick stand of common reed, while other sections were bare banks with plant species such as mallow and heliotrope interspersed along the top.
Rice	The dominant plant cover in this drain was a mat of saltgrass and bermuda grass. Other plant species include heliotrope, salt bush, and mexican sprangletop.
Rice No. 3	At this proposed interceptor location, the banks of this drain were predominantly bare, with only scattered occurrence of established plants such as mallow or salt bush.
Rice No. 4	Saltgrass and bermuda grass are the dominant vegetative feature of this drain, covering the lower edges of the banks.
Rice No. 14	Saltgrass and bermuda grass are the dominant vegetative feature of this drain, covering the lower edges of the banks.
Wildcat	Dominated by saltgrass and bermuda grass on the lower edges of its banks, with a few sparse patches of salt bush and baccharis growing along the slopes.
Cook	Common plant species found along this drain include common reed, mexican sprangletop, and saltgrass, which form a dense cover on the lower edges.
Sumac	At the proposed interceptor location, the western portion of the canal is heavily vegetated, primarily with salt bush and salt cedar.
Fillaree	At the proposed interceptor location, this drain is heavily vegetated with salt bush as the dominant cover type. Saltgrass, bermuda grass, and some salt cedar are interspersed along the lower edges of the banks.
Dixie	Common reed and salt bush are the dominant vegetation types in this drain. Sparse patches of cattail and sedge also grow along the water line and bottom of this drain.
Dixie No. 1	This is primarily vegetated with salt cedar and salt bush. Cattail, saltgrass, and bermuda grass also grow along the banks. Farther east, the banks along Dixie Drain No. 1 became deeply cut with steep slopes. Most of the vegetation occurs in the bottom of the drain channel, forming a dense thicket of salt cedar and salt bush.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Dixie No. 5	Vegetation along Dixie No. 5 is mostly saltgrass and bermuda grass; however, some sections of this drain are heavily vegetated with cattail and sedge. Salt bush, salt cedar, bassia, and mexican sprangletop also occur along this drain.
Fern Canal	The banks of this drain are primarily vegetated with dead and live bassia, salt bush, and saltgrass.
Fig	Plan species common to this drain include salt cedar, common reed, saltgrass, and sedge. Small, intermittent patches of saltgrass and sedge occur close to the water line.
Wormwood	Light coverings of saltgrass and bermuda grass occur on the predominantly barren banks. Salt bush, mexican sprangletop, common reed, and salt cedar are also found in varying densities along the length of this drain.
Greeson	Dominant vegetation in this drain include saltgrass, bermuda grass, and mexican sprangletop. These species grow toward the lower edges of the banks, creating a dense cover at the water line.
Greeson No. 2	Saltgrass and bermuda grass grow in a thick layer along the lower edges of this drain. Sparse patches of cattail and sedge occur intermittently.
Martin	Thick stands of cattail occur in this drain, while salt bush forms a border near the tops of the banks. In section of this drain, the emergent vegetation obscures the drain channel.
Brockman	Vegetation consists of predominantly saltgrass and bermuda grass growing at the lower edges of the bank slopes.
Brockman No. 2	Vegetation consists of predominantly saltgrass and bermuda grass growing at the lower edges of the bank slopes.
Carr	The banks slopes are largely barren, with patches of mexican sprangletop and saltgrass growing along the water's edge. Mallow and salt bush occur sparsely on the tops of the banks.
All American No. 11	The dominant plant species in this drain is saltgrass, which occurs in thick mats along the water line. Small clumps of salt bush and mexican sprangletop also occur along the banks.

NWR National Wildlife Refuge

Hurlbert (1997) also surveyed drains in the HCP area. In this study, the percent cover for each of the major plant species (e.g., *Phrgamites, Tamarix*, *Pluchea, Typha*, and *Atriplex*) and habitat type (e.g., herbaceous, bare ground, and other) was estimated in 10 drains. Each drain was surveyed by driving its length and stopping every 0.1 mile. At each stop, percent coverage for each major vegetation species (*Phragmites, Tamarix, Pluchea, Typha*, and *Atriplex*) or habitat type (herbaceous, bare ground, and other) was determined within the area extending 100 feet on either side of the point. The survey was conducted in the winter (late 1994/early 1995) and spring (late May 1995). Based on these data, Hurlbert (1997) calculated the average percentage cover of each major vegetation species in each drain separately for the winter and spring surveys. The 10 drains surveyed were distributed throughout Imperial Valley and covered about 78 miles (Figure 2.3-3).[1]

[1] Data for P Drain are believed to be reported incorrectly in Hurlbert (1997), and data from this drain were not used in this analysis. Without inclusion of P Drain, approximately 70 miles of drains were surveyed.

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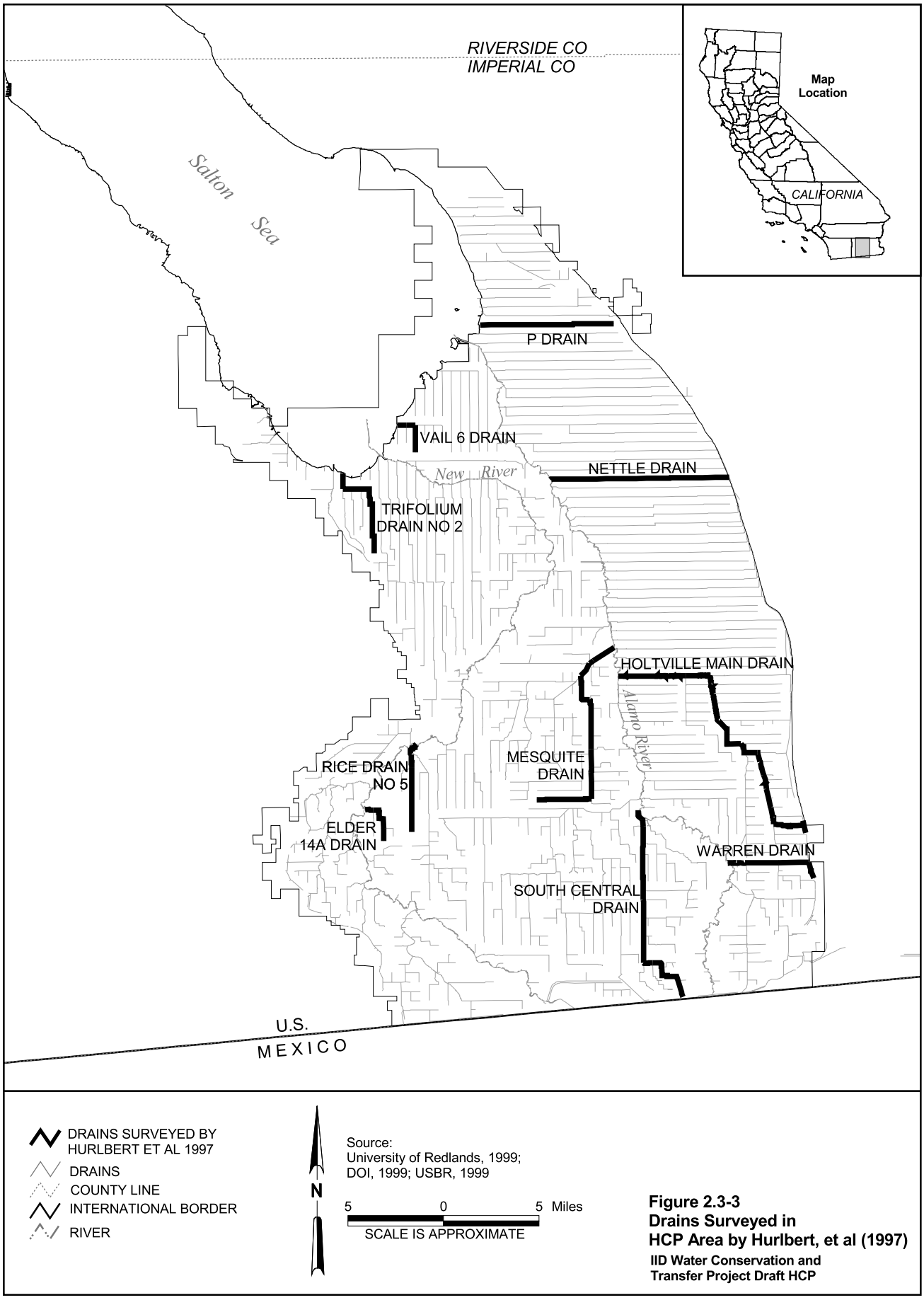

Figure 2.3-3
Drains Surveyed in HCP Area by Hurlbert, et al (1997)
IID Water Conservation and Transfer Project Draft HCP

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Hurlbert (1997) summarized the data in two ways. First, the percentage of the total drain covered by the major vegetation species and cover categories was calculated (Table 2.3-3). This method provides the most accurate characterization of the plant species composition and percentage of the drain supporting vegetation. The second method of summarizing the data focused on habitat characteristics rather than plant species composition (Table 2.3-4). In this method, survey locations with less than a median of 15 percent vegetation cover were classified as bare ground/herbaceous. Survey locations with between 15 and 37.5 percent vegetation cover were classified as sparse cover.

TABLE 2.3-3
Percentage of Drain Area Covered by Each Major Plant Species or Other Habitat Type for the 10 Drains Surveyed by Hurlbert

	Drains									
Vegetation Cover	**Vail Cutoff**	**Trifolium No. 2**	**Elder Nos. 14/14A**	**Rice No. 5**	**Nettle**	**Holtville Main**	**Warren**	**South Central**	**Mesquite**	**P[a]**
Herbaceous	70.7	44.9	32.2	29.2	55.5	22.9	46.3	40.7	34.9	*34.9*
Bare Ground	18.9	31.7	58.9	64.8	31.3	20.7	33.0	41.9	45.8	*45.8*
Atriplex		0.6				2		1.1	3.2	*3.2*
Phragmites	7.5	3.5	2.1	3.3	10.6	7.7	12.9	3.5	0.9	*0.9*
Pluchea		8.7		0.9	0.7	6.8		4.6	5.2	*5.2*
Tamarix		7.6	0.5			29.6	1.0	0.5	3.0	*3.0*
Typha						6.3	1.5	3.8	1.1	*1.1*
Other	2.7	2.9	6.3	1.7	1.7	3.8	5.1	3.7	6.1	*6.1*

[a] Numeric values reported of percent vegetation for P Drain are identical to Mesquite Drain and are inconsistent with other information presented for P Drain. Thus, these values are believed to be incorrect.

Source: Hurlbert 1997.

TABLE 2.3-4
Percent of Different Habitat Types Occurring at Drains Surveyed by Hurlbert

	Drains									
Habitat	**Vail Cutoff**	**Trifolium No. 2**	**Elder Nos. 14/14A**	**Rice No. 5**	**Nettle**	**Holtville Main**	**Warren**	**South Central**	**Mesquite**	**P**
Bare Ground/ Herbaceous	79.2	41.0	88.0	89.2	58.2	13.5	59.1	61.9	48.8	64.3
Sparse Cover	6.3	31.4	8.0	4.9	19.8	22.2	17.2	20.0	36.0	17.1
Phragmites	14.6	2.9	4.0	3.6	19.6	9.4	19.8	3.5	1.2	7.1
Pluchea	0	13.3	0	0	1.5	6.4	0	6.2	6.0	5.5
Tamarix	0	10.5	0	0	0	35.1	0	0.5	0	0
Phragmites/ Pluchea	0	0	0	2.5	0.5	0	0	0.5	0	5.5
Atriplex	0	0	0	0	0.5	0	0	0.5	0.4	0
Typha	0	0	0	0	0	7.6	0	0	0.8	0

TABLE 2.3-4
Percent of Different Habitat Types Occurring at Drains Surveyed by Hurlbert

	Drains									
Habitat	**Vail Cutoff**	**Trifolium No. 2**	**Elder Nos. 14/14A**	**Rice No. 5**	**Nettle**	**Holtville Main**	**Warren**	**South Central**	**Mesquite**	**P**
Tamarix/ Pluchea	0	0	0	0	0	3.2	0	6.7	0	0
Phragmites/ Tamarix	0	1.0	0	0	0	0	3.9	0	0	0
Tamarix/ Typha	0	0	0	0	0	1.8	0	0	0	0
Tamarix/ Other	0	0	0	0	0	0.8	0	0	0	0
Pluchea/ Atriplex	0	0	0	0	0	0	0	0	0	0.7
Other	0	0	0	0	0	0.4	0	0.5	6.8	0

Source: Hurlbert 1997.

The qualitative descriptions from the 1994 EIR and Hurlbert (1997) data show that vegetation typically is very limited along the drains. Both studies also indicate that common reed (*Phragmites* sp.) is the most prevalent plant species. Cattails are uncommon and occur in small, localized areas. With the exception of small, localized areas of cattails and occasionally bulrushes, the drains do not support emergent vegetation. As such, habitat availability and quality for marsh-associated species are poor.

The data reported by Hurlbert (1997) were used to estimate the acreage of vegetation supported by IID's drainage network. Hurlbert (1997) only characterized vegetation between the drain banks. A standard lateral drain (excluding the water surface) is about 14 feet wide at the top of the drain embankment (Figure 2.3-4). Assuming all drains are 14 feet wide, the 1,456 miles (cited from IID Memorandum, dated October 4, 2000) of drains in the Imperial Valley cover 2,471 acres. However, as described above, potential habitat includes only a small proportion of the drains. The average percent cover of bare ground and herbaceous cover[2] was calculated for each of nine drains from data in Hurlbert (1997).[3] The remaining portion of the drain was assumed to be vegetated. It was then assumed that the drains surveyed were a representative sample of all drains in the Imperial Valley. Acres of vegetation supported by the entire drainage system were calculated based on the percentage vegetation supported by the drains surveyed weighted by the drain's length. With this method, an estimated 652 acres of vegetation are supported in the drains.

[2] Herbaceous cover consists of annual weedy vegetation that provides little or no habitat value to wildlife.

[3] As noted in Table 2.3-4, data presented for P Drain in Hurlbert (1997) are believed to be incorrectly reported. As such, data from P Drain were not used in this analysis.

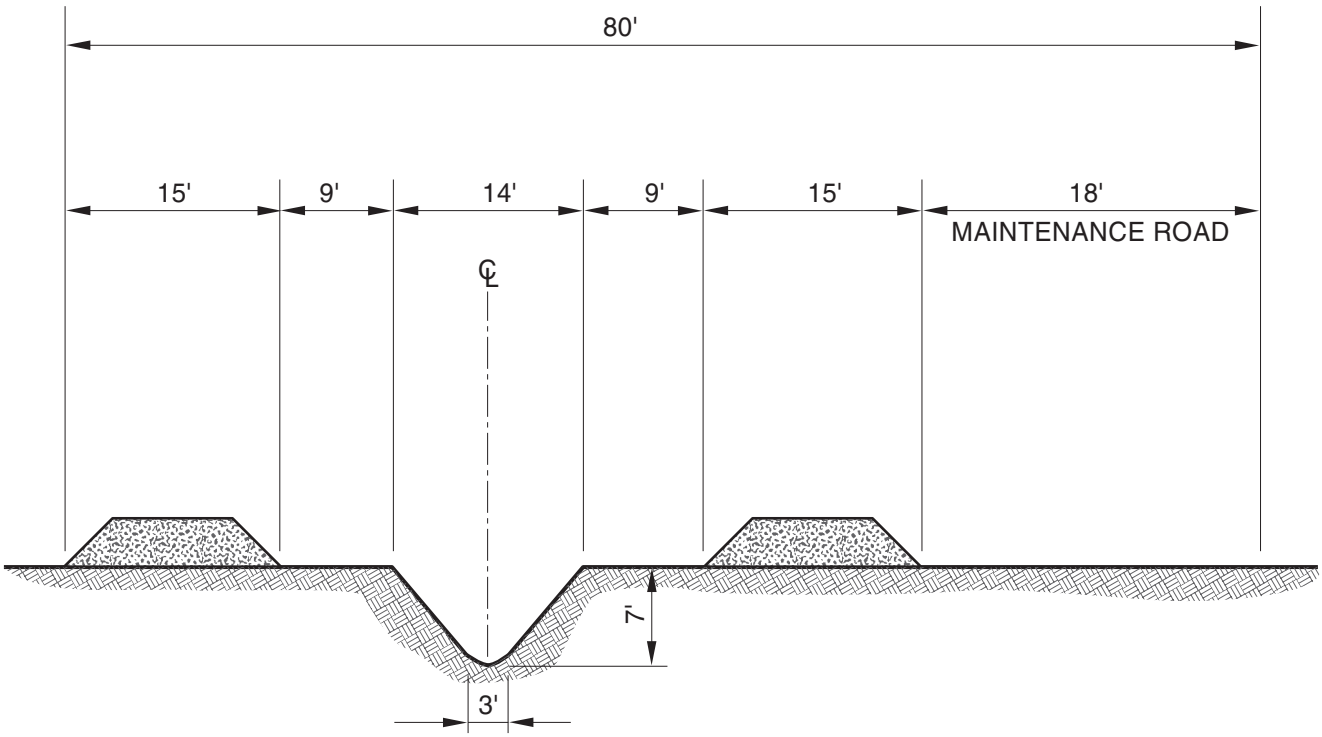

Figure 2.3-4
Typical Lateral Drain Profile
IID Water Conservation and Transfer Project Draft HCP

Survey locations with 37.5 percent vegetation cover or greater were classified according to the dominant vegetation species (Table 2.3-4). Values reported in Tables 2.3-3 and 2.3-4 are the average of winter and spring surveys.

Hurlbert's (1997) quantitative data are consistent with the qualitative descriptions of the drains reported in the 1994 EIR (IID 1994). The first method used to characterize vegetation showed that herbaceous cover and bare ground comprised the majority of the drains (median equals 82.7 percent, range 43.6 to 94 percent). With the exception of Holtville Main Drain, herbaceous cover and bare ground comprised about 75 to 95 percent of the drains. The second method used to characterize drain habitat showed a similar pattern. Bare ground / herbaceous cover and sparse cover comprised 72 to 96 percent of the drains, except for the Holtville Main Drain where these habitats covered only 35 percent of the drain.

As noted above, the nine drains surveyed were assumed to be a representative sample of the entire drainage system. This assumption may not be accurate but is necessary in the absence of more complete information. In particular, the Holtville Main Drain is an unusual drain. Good water quality combined with the drain's large size results in Holtville Main Drain supporting substantially more vegetation than is typical for drains. As shown by Hurlbert's data, Holtville Main Drain is 56 percent vegetated while the next most vegetated drain (Trifolium 2) is only 23 percent vegetated. The remaining drains surveyed have less vegetation. Holtville Main Drain was also the longest drain surveyed at 17.8 miles followed by South Central Drain at 12.2 miles. Because the estimate of the amount of vegetation in the drainage system was derived from the percentage of vegetation in each of the drains surveyed weighted by their lengths, inclusion of Holtville Main Drain (the longest drain with an atypical amount of vegetation) may have resulted in an overestimation of the amount of vegetation in the entire drainage system.

Only a small proportion of the vegetated acreage consists of cattails which are favored by wildlife species associated with drain habitats. The Holtville Main Drain had the greatest percentage of cattails at 6.3 percent followed by the South Central, Warren, and Mesquite Drains at 3.8, 1.5, and 1.1 percents, respectively. The remaining five drains did not support cattails. For the nine drains, the average percent cover of cattails weighted by drain length was 2.5 percent. Based on this average, the entire IID drainage system supports about 63 acres of cattail vegetation.

Conveyance System

Canals that convey water from the Lower Colorado River to customers within the IID service area support little vegetation. Approximately 70 percent of the 1,667 miles (cited from IID Memorandum, dated October 4, 2000) of canals in Imperial Valley are concrete-lined or in pipes, and therefore do not support rooted vegetation. Embankment slopes of the lined canals also are maintained free of vegetation. About 537 miles (cited from IID Memorandum, dated October 4, 2000) of the delivery system consist of earthen channels. The canal slopes can support vegetation that typically consists of bands of vegetation at the water surface. The bands of vegetation consist of common reed, saltgrass, Bermuda grass, and seedling salt cedar. Tree and shrub cover are rare or nonexistent on most canals and laterals (IID 1994). Along the AAC, an almost continuous thick stand of common reed, 3- to 15-feet wide) grows along both sides of the canal for the majority of its length. The 30-mile long section of the AAC between Pilot Knob and Drop 4 supports about 30 acres of common reed (Reclamation and IID 1994). Vegetation along the canals is of

minimal value to wildlife because it has little emergent vegetation and water velocity and depth in the canals are too great for most species.

Water seepage has induced phreatophytic vegetation[4] to develop along the AAC in a landscape previously dominated by dry, desert scrub. Between Drops 2 and 3, about 100 acres of scattered phreatophytic vegetation is supported by seepage. Only about 1 acre is emergent wetland vegetation. The remaining vegetation consists of screwbean and honey mesquite (22.6 acres), salt cedar (28.7 acres), and arrowweed (47.2 acres). However, under the AAC lining project this portion of the AAC will be abandoned and this vegetation will be lost. Effects of loss of this habitat on listed species have been evaluated in a previous Section 7 consultation. For this HCP, the lining project is assumed to be in place. A larger (1,422 acres) marsh complex that will not be affected by the AAC lining project is located between Drops 3 and 4. Marsh vegetation comprises about 111 acres of the complex. The other vegetation present within the complex includes salt cedar (755 acres), arrowweed (233 acres), screwbean mesquite (251 acres), cottonwood and willow (39 acres).

In addition to these areas, phreatophytic vegetation supported by seepage from the AAC exists between Drop 4 and the East Highline Canal. This area is about 100 to 150 acres in size. Closer to the Lower Colorado River in the vicinity of Mission Wash, seepage from the AAC probably contributes to supporting several areas of phreatophytic vegetation totaling about 100 acres. The vegetation composition of these areas has not been determined, but would be expected to exhibit a plant species composition similar to that found in other seepage areas along the AAC.

Seepage communities along Imperial Valley canals are rare and are generally limited to areas adjacent to the East Highline Canal. As part of the system-based water conservation activities, IID may install seepage recovery systems along portions of the west side of the East Highline Canal (Chapter 1, Section 1.7.2.2). Seepage communities in the vicinity of proposed seepage recovery systems were digitized from Digital Orthophoto Quarter Quadrangles (DOQQ) and visited during May 2001 to assess general vegetation characteristics. Seepage communities also occur on the east side of the East Highline Canal but these areas would not be affected by covered activities. The location of seepage communities in the vicinity of proposed seepage recovery systems is shown on Figure 2.3-5 and the sizes of the seepage areas are listed in Table 2.3-5.

The plant species composition of the seepage communities is diverse and varies substantially among the seepage areas. Arrowweed, common reed, and tamarisk are the most common species in the seepage communities, with mesquite, cattails and a few cottonwoods present in some areas. About 412 acres of vegetation supported by seepage from the East Highline Canal occurs in areas where seepage recovery systems are under consideration.

Unmanaged Vegetation Adjacent to the Salton Sea

Vegetation has naturally developed in some locations along the margins of the Salton Sea. This phreatophytic vegetation occurs above the shoreline and shoreline strand community (see the following discussion of tamarisk scrub habitat). Unmanaged vegetation includes

[4] Phreatophytic vegetation is vegetation associated with wet areas. In the HCP area, phreatophytic plant species include tamarisk, common reed, willows, and cattails.

TABLE 2.3-5
Seepage Communities Along the East Highline Canal. Area ID refers to Figure 2.3-5.

Area ID	Acres	Area ID	Acres
1	3.2	17	10.2
2	6.8	18	7.9
3	3.1	19	6.1
4	3.3	20	43.3
5	2.0	21	24.8
6	0.9	22	26.6
7	11.9	23	3.8
8	16.1	24	56.6
9	18.1	25	54.9
10	13.5	26	3.6
11	6.8	27	5.7
12	13.4	28	7.0
13	12.3	29	11.0
14	8.3	30	3.5
15	6.5	31	5.6
16	9.4	32	6.0
Grand Total		**412.2**	

diked wetlands that are below the water surface elevation of the Salton Sea. The Salton Sea database (University of Redlands 1999) refers to these unmanaged areas of phreatophytic vegetation as "adjacent wetlands."

The Salton Sea database (University of Redlands 1999) classifies 6,485 acres along the Salton Sea as adjacent wetlands, and 64 acres as mudflat. Tamarisk and iodine bush are the most common species of adjacent wetlands (Figure 2.3-6; Table 2.3-6). Cattails and bulrushes are identified as the primary vegetation on 217 acres of adjacent wetlands. In the HCP area, the Salton Sea database identifies three parcels as being dominated by cattails: one on the southwestern edge of the Salton Sea (35 acres), and two on the southern edge (32 acres). A fourth parcel on the eastern edge of the Salton Sea is dominated by bulrushes (17 acres). However, three of these areas are misclassified in the Salton Sea database. The first parcel of 35 acres is a managed duck club and therefore does not meet the definition of an "adjacent wetland" (i.e., unmanaged areas). Of the two parcels totaling 32 acres, one is an IID drain and the other is a marsh managed by the U.S. Fish and Wildlife Service (USFWS). The drain parcel is managed by IID as part of its drainage system. Habitat in this drain was accounted for in the quantification of habitat in the drainage system above. The other parcel managed by USFWS does not meet the definition of an adjacent wetland (i.e., unmanaged areas). The last parcel encompassing 17 acres is sustained by runoff from the California Department of Fish and Game (CDFG's) managed marsh area in the Wister Unit. The remaining 133 acres

Figure 2.3-5
Seepage Communities Adjacent to the East Highline Canal
IID Water Conservation and Transfer Project HCP

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RIVERSIDE CO

SAN DIEGO CO

IMPERIAL CO

Salton Sea

Niland

Ocotillo Wells

Calipatria

New River

Alamo R

Map Location

CALIFORNIA

PRIMARY VEGETATION

- MIXED HALOPHYTIC SCRUB OR IODINE BRUSH
- SAFFLOWER, BARLEY OR TIMOTHY
- COMMON REED
- BULRUSH
- SEA-BLITE
- TAMARISK
- BROAD-LEAF CATTAIL

HABITATS

- ADJACENT WETLAND
- MANAGED WETLAND
- TAMARISK SCRUB
- DUCK CLUB
- COUNTY LINE
- RIVER
- CITIES

Sources:
University of Redlands, 1999; DOI, 1999; and USBR LCR GIS

N

3 0 3 Miles

SCALE IS APPROXIMATE

Figure 2.3-6
Habitat Around the Salton Sea
IID Water Conservation and Transfer Project Draft HCP

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identified as adjacent wetland dominated by cattail or bulrush occur adjacent to the northwestern portion of the Salton Sea. This area is outside of the HCP area.

TABLE 2.3-6
Primary Vegetation of Areas Classified as Adjacent Wetlands in the Salton Sea Database

Primary Vegetation	Total Acres at Salton Sea	Percentage of Adjacent Wetlands	Acres in HCP Area
Iodine bush	1,577	24	1,509
Mixed halophytic shrubs	65	1	-
Arrowweed	597	9	-
Bulrush	17[a]	<1	17
Sea-blite	86	1	86
Tamarisk	2,349	36	437
Cattail	200[a]	3	67
No primary wetland vegetation	1,595	25	1,305
Total	**6,485**		**3,421**

[a]See text for further description of these areas.
Source: Salton Sea Database (University of Redlands 1999)

Managed Marsh

Managed marsh consists of areas that are actively managed for one or more marsh habitat values and functions. In the HCP area, managed marsh occurs primarily on the state and federal refuges. Private duck clubs also support managed marsh.

The Imperial Wildlife Area (WA), managed by the CDFG, and the Sonny Bono - Salton Sea National Wildlife Refuge (NWR), managed by the USFWS lie within the HCP area (Figure 2.3-7). Both of these refuges were established to provide winter habitat for migratory waterfowl. However, in addition to providing habitat for migratory waterfowl, both refuges are managed to provide habitat for a wide diversity of resident and migratory wildlife. The refuges are also managed to provide marsh habitat and offer the highest quality, year-round marsh habitat value in the HCP area. Both Imperial WA and the Sonny Bono Salton Sea NWR receive irrigation delivery water from IID. Agricultural drainage water is not used on the refuges.

The HCP area also contains 17 private duck clubs, covering about 5,582 acres. Most of the duck clubs are near the Salton Sea. These clubs are managed exclusively to attract wintering waterfowl, although other wildlife will use these marsh areas when available. Managed marsh units on the duck clubs are flooded in fall and winter when wintering waterfowl are present in the valley. They are not flooded during other times of the year; therefore they do not provide habitat for year-round resident wildlife that are associated with marsh habitat. Generally duck clubs receive irrigation delivery water from the IID.

2.3.2.2 Tamarisk Scrub Habitat

Native riparian plant communities in the southwestern desert are dominated by cottonwoods and willows, but palo verde and mesquite also occur. Much of the native riparian plant communities in the desert southwest has been replaced by nonnative plant species, particularly tamarisk. Tamarisk scrub communities supplant native vegetation

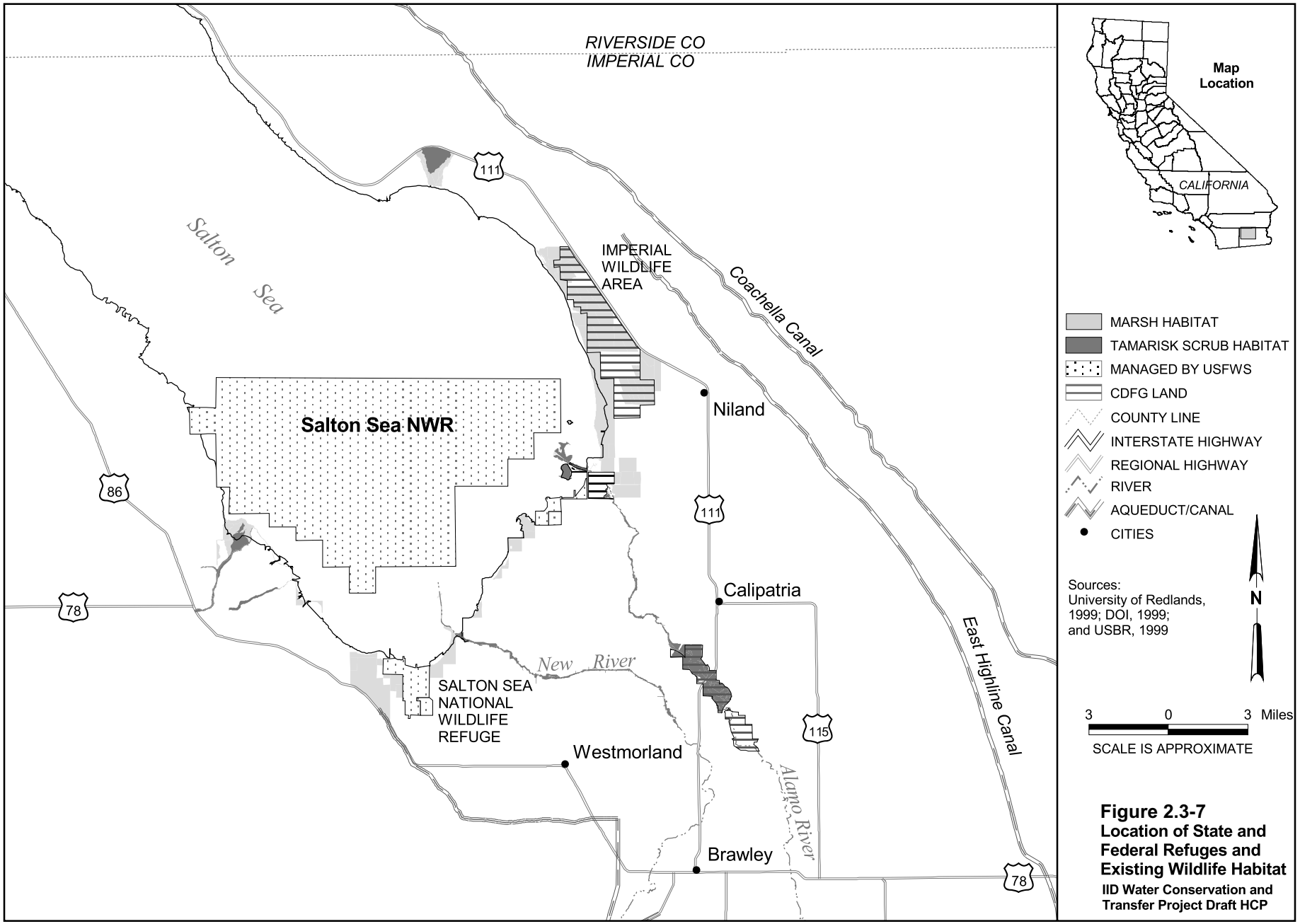

Figure 2.3-7
Location of State and Federal Refuges and Existing Wildlife Habitat
IID Water Conservation and Transfer Project Draft HCP

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following major disturbance, including alterations in stream and river hydrology, and can form extensive stands in some places. Characteristic species include salt cedar (*Tamarix chinensis, T. ramosissima*), big saltbrush (*Atriplex lentiformis*), *Coldenia palmeri*, and saltgrass (*Distichlis spicata*); associate species can include common reed (*Phragmites communis* var. *berlandieri*) and giant reed (*Arundo donax*).

In the HCP area, tamarisk scrub is found along the New and Alamo Rivers. Areas along the New River are composed of a virtual monoculture of tamarisk, with only a few areas of native vegetation. Vegetation along the Alamo River is similarly dominated by tamarisk. Dredging has extended the river channels of both the New and Alamo Rivers into the Salton Sea. The banks of the extended river channels support a thick strand of tamarisk and common reed.

The width of tamarisk scrub stands adjacent to the New and Alamo Rivers varies substantially along their lengths. Based on a review of DOQQs, much of the length of the rivers supports only a narrow band of tamarisk of less than 50 feet on both sides of the channels. In more limited portions of the rivers, larger stands of tamarisk have developed that may extend 500 feet or more from the river channel. To estimate the amount of tamarisk scrub habitat occurring along the floodplains of the New and Alamo Rivers, vegetation along the rivers was digitized from the DOQQs. Vegetation along the rivers was assumed to consist of tamarisk scrub. Based on this work, the New and Alamo Rivers support about 2,568 acres and 962 acres of tamarisk scrub habitat respectively, for a total of 3,530 acres.

Tamarisk scrub occurs in other portions of the HCP area, wherever water is available, including the margins of the Salton Sea (Table 2.3-4). Tamarisk scrub is also one of the major plant species comprising vegetation along the drains and is found in seepage areas adjacent to canals. The HCP area contains about 438 acres of the tamarisk-dominated areas adjacent to the Salton Sea (University of Redlands 1999). The source of the water that supports tamarisk adjacent to the Salton Sea is uncertain, but is likely the result of shallow groundwater and seepage rising to the surface at its interface with the sea. In addition to the adjacent wetlands, tamarisk is a primary component of areas designated as shoreline strand community in the Salton Sea database. The shoreline strand community occupies about 293 acres (University of Redlands 1999) immediately adjacent to the Salton Sea and consists of tamarisk and iodine bush. As with the tamarisk-dominated areas adjacent to the Salton Sea described above, the source of water supporting this community is undetermined, but is likely the result of shallow groundwater and seepage rising to the surface at its interface with the sea. Along IID's drainage system, Hurlbert (1997) can be used to estimate the acreage of tamarisk scrub supported by the drains. Of the drains surveyed by Hurlbert (1997), the percentage of drain area comprised of tamarisk varied from 0 to 29.6 percent (Table 2.3-3), yielding a weighted average percentage of 8.7. Assuming that tamarisk covers 8.7 percent of the drains, the drainage network in the HCP supports about 215 acres of tamarisk scrub habitat.

Cottonwood-willow habitat is largely absent from the HCP area. Cottonwoods and willows occur in seepage communities along the AAC. In addition, some remnant cottonwoods occur in Imperial Valley at distances of 20 to 60 feet from the East Highline Canal (IID 1994). A few patches of willow also persist along the Alamo River.

2.3.2.3 Agricultural Field Habitat

Irrigated agricultural land is the predominant land cover type in the Imperial Valley, and comprises most of the HCP area. Agricultural fields attract a variety of wildlife species. The crops grown, the methods used and the total acreage in production within IID's service area are based on the decisions of individual farmers. Current and anticipated market prices have an important role in the types of crops that are economically beneficial for farmers to grow. As a result, the total acreage in agricultural production and the types and amount of crops grown fluctuate from year-to-year. The different types of crops and the range of acreage of each of the major crops grown within the service area for 1999 are shown in Table 2.3-7. The cropping pattern is likely to be similar to Table 2.3-7 for the short term, but could change during the term of the permit as markets for various crops or other conditions change.

2.3.2.4 Salton Sea Habitat

Wildlife habitats at the Salton Sea have been largely described previously in Section 2.3.2.1, Drain Habitat and Section 2.3.2.2, Tamarisk Scrub Habitat. However, for the species covered by the HCP, use of the Salton Sea is a function of the abundant food resources, availability of a large, open body of water, and the presence of unique habitat features, rather than vegetation composition. The following discussion focuses on the food resources and food chain relationships, and unique habitat features supported by the Salton Sea.

Food Chain Relationships

The Salton Sea is considered eutrophic with plentiful phytoplankton, a condition that often results in algal blooms (Hurlbert 1999a). The dominant primary producers are phytoplankton and phytobenthos; plant life in the Salton Sea predominantly is single-celled algae. Major groups of algae include diatoms (*Chrysophyta*), dinoflagellates (*Pyrrophyta*), and green algae (*Chlorophyta*) (Carpelan 1961). Blue-green algae (*Cyanophyta*) have also been found on the seafloor in shallow water and on buoys and pilings in the Salton Sea. During recent sampling, several new species of diatoms were observed (Hurlbert 1999b). Many of the previously observed species are still present in the Salton Sea. The phytoplankton composition changes may be caused by an increase in the salinity of the Salton Sea, as well as from the introduction of tilapia (Hurlbert 1999b).

Within the Salton Sea, five phyla of invertebrates are represented: Protozoa, Rotifera, Nematoda, Annelida, and Arthropoda. Some of the common invertebrates found in the Salton Sea include ciliate protozoans, foraminifera, rotifers, copepods, barnacle, pileworm, amphipod, and the water boatman (a corixid). The rotifer *Brachionus plicatilis* is the dominant rotifer species, is completely planktonic, and has great value as food for larval fishes. The pileworm *Neanthes* is a major food source for fish and some birds and is a significant species in the benthos of the Salton Sea. Pileworms have been abundant since their introduction to the Salton Sea during the 1930s and are the principal detritus-feeding benthic organisms in the Salton Sea.

The major zooplanktonic organisms in the Salton Sea include *Brachionus*, copepods (*Apocyclops dengizicus*, *Cletocamptus dietersi*), the egg and larval stages of the pileworm, and the larval stages of the barnacle (*Balanus amphitrite saltonensis*). Other zooplanktonic species